



SOLAR ORBITER ENERGETIC PARTICLE DETECTOR

STEP EM Functional Test Procedure

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STEP EM Functional Test Procedure

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CHANGES RECORD

Issue	Revision	Date	Modified by	Section / Paragraph modified	Change implemented
1	0	17/03/2014	Panitzsch	All	Initial release
1	1	02/07/2014	Panitzsch	2.3	modified command to start the procedure

1. Engineering Model of STEP

The engineering Model (EM) of STEP is a model not deliverable to ESA, but planned to be integrated at suit level to the ICU to check the unit's performance and functionality. The EM of the STEP unit consists of a

- Low Voltage Power Supply (LVPS)
- Digital Board
- Detector Assembly Board with a Idef-X asic and a Si-detector mounted
- The housing

In contrast to the following models, the EM model of STEP (represented by the STEIN unit) does not contain permanent magnets. A picture of the fully assembled EM unit is shown in the figure below. Configurations of parts of the STEP EM are

- LVPS: V2
- Digital Board: V2; FPGA firmware date: 2014-03-28 or newer
- Detector Assembly: EM Proto



STEP EM

Pictures of all sub-assemblies are shown below:

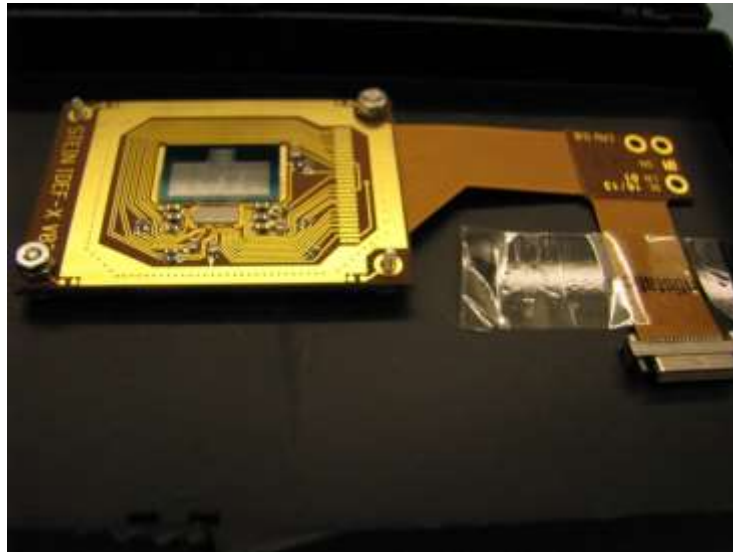


Low Voltage Power Supply inside the corresponding housing part



Digital Board with FPGA

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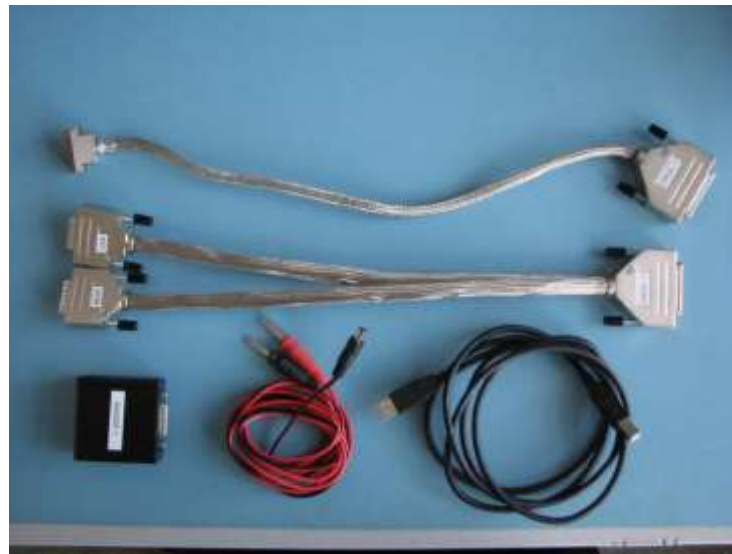
Detector Assembly with Idef-X and detector



Harness

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STEP EGSE

2 FUNCTIONAL TEST SET-UP AND PROCEDURE

The STEP EM functional test is planned as follows:

1	Short aliveness test	STEP unit + EGSE	send and receive slow control commands to Idef-X
2	Direct streaming	STEP unit + EGSE	same setup, measuring cosmic muons and Bi207
3	Functional Test with ICU emulator		

2.1 Short aliveness test

In this test the end-to-end communication from the EGSE laptop ("etsolo1") to the Idef-X is to be tested. The setup is (as shown in the figure below):

Laptop ↔ USB cable ↔ SOLOGSE1 (powered by a laboratory power supply at 28V, current limit: 250mA) ↔ Y-cable ↔ adaptor cable ↔ STEP/STEIN

The unit is powered by a 32V laboratory power supply via the EGSE at 28V and a current limit of 250mA. A test script shall be executed to automatically read and write the registers and to generate and read test pulses.



2.2 Direct steaming (only applicable if STEP is equipped with a working detector)

This test may be performed before and/or after the integration of the unit to the instrument suite. In the case that this test is performed before the integration, the setup is identical to the setup above. If already integrated to the instrument suite the setup is as simple as the STEP unit being connected via the harness to the ICU. Refer to the document "SO-EPD-KIE-PR-0013-iss1_rev0-STEP-EM-Integration-procedure.pdf" for the integration procedure.

The aim of this streaming mode measurement is to acquire data of cosmic muons as well as a Bi207 spectrum. The commands used to acquire data are mentioned in the section 2.5. in case of performing this test before integration and thus not being connected to the ICU.

2.3 Procedure

The standard procedure to switch on the unit during the tests mentioned above is:

1. Connect the different parts of the setup as described in the corresponding sections
2. Switch on power supply $U = 28 \text{ V}$ with a current limitation of 250mA
3. In the laptop, type the following command to collect data
4. When done, switch off the power supply and disconnect the parts

To START data acquisition

```
./sologse.py
```

```
SOLOGSE > STEP_short_aliveness_test()
```

To STOP data acquisition

```
SOLOGSE > Stop()
```

```
Ctrl-C for coming out of the prompt
```